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MANELLI DENISON & SELTER			HERTZOG, ARDITH E	
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1754

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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/681,210	Applicant(s) JIA, CHARLES Q.	
	Examiner Ardith E. Hertzog	Art Unit 1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 October 2003 & 21 April 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>21 Apr 2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Priority*

1. Receipt is hereby acknowledged of papers submitted under 35 U.S.C. § 119(a)-(d), which papers have been placed of record in the file.

### *Information Disclosure Statement*

2. Receipt is hereby acknowledged of the information disclosure statement, filed April 21, 2004. As the submission is in compliance with the provisions of 37 CFR § 1.97, the information disclosure statement has been considered, in accordance with the enclosed PTO-1449.

### *Drawings*

3. The drawings are objected to, because:
  - a. In Figure 1, "(SC)" should apparently be "(RO)", for consistency with the rest of the disclosure.
  - b. In Figure 2, the temperature symbol along the x-axis is incomplete; and
  - b. In Figure 8, in the legend, each "OC" should evidently be "°C".
4. **However, all other aspects of the drawings are accepted, in accordance with the enclosed PTO-948.**
5. **Corrected drawing sheets, with amendment to the specification as/if necessary, are required in reply to this Office action to avoid abandonment of the**

**application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended”. If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR § 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. Any objection to the drawings will not be held in abeyance.**

***Minor Informalities***

6. The disclosure is objected to, because of the following minor informalities:
  - a. At page 6, line 23, it appears that the phrase “of reduced SO<sub>x</sub> concentration” should be moved to **after** the phrase “to produce a treated gas” (at lines 23-24), for clarity; that is, the language “an effective SO<sub>x</sub> removal temperature of reduced SO<sub>x</sub> concentration” (at p. 6, lines 22-23) is not entirely understood.

- b. At page 7, line 4, **both** occurrences of "activated coke" should evidently be "activated carbon", for consistency with the beginning of the paragraph (see p. 6, last line).
- c. At page 7, lines 10 and 11, it appears that "said activated carbon" and "said activated coke and" should be deleted (?) (note related 35 U.S.C. 112, second paragraph, rejection in paragraph 11. below).
- d. At page 9, line 14, "- are graphs" should evidently be "is a graph".
- e. At page 16, line 4, "So<sub>2</sub>" should be "SO<sub>2</sub>".
- f. "While there is no set statutory form for claims, the present Office practice is to insist that each claim must be the object of a sentence starting with 'I (or we) claim,' 'The invention claimed is' (or the equivalent)" (see MPEP § 608.01(m)).
- g. In accordance with point a. above, in claim 1, it appears that the phrase "of reduced SO<sub>x</sub> concentration" should be moved to **after** the phrase "to produce a treated gas" (at lines 4-5 on p. 21), for clarity; that is, the language "an effective SO<sub>x</sub> removal temperature of reduced SO<sub>x</sub> concentration" (at p. 21, lines 4-5) is not entirely understood.
- h. In claim 3, it is suggested that "selected" be deleted, since Markush group-style language (i.e., "selected from") is typically not used for temperature ranges (see MPEP § 2173.05(h) I.).
- i. In claim 8, it is suggested that "effective" be inserted before "SO<sub>x</sub> removal temperature" (at line 18 on p. 21), for consistency with claim 1 (upon which claim 8 depends), as well as claim 7.

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- j. In accordance with point b. above, in claim 10, **both** occurrences of “activated coke” should evidently be “activated carbon” (at line 25 on p. 21), for consistency with the claim 10 preamble.

Appropriate correction of all the above is required.

***Claim Rejections - 35 U.S.C. § 112***

7. The following is a quotation of the first paragraph of 35 U.S.C. § 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claim 8 is rejected under 35 U.S.C. § 112, first paragraph, because the specification, while being enabling for processes for reducing the concentration of SO<sub>x</sub> in a SO<sub>x</sub>-containing gas, wherein said SO<sub>x</sub>-containing gas further comprises the **specific** metal mercury, does not reasonably provide enablement for processes for reducing the concentration of SO<sub>x</sub> in a SO<sub>x</sub>-containing gas, wherein said SO<sub>x</sub>-containing gas further comprises **any** metal, as recited in claim 8. It is respectfully submitted that the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims, since applicant **explicitly** states, “The processes as hereinabove defined are also applicable to removal of mercury species” (see p. 6, lines 31-32, of the specification). That is, there appears to be no discussion in the specification of such processes as also applicable to the removal of **any** metal species, as recited in claim 8. Incorporating the limitations of claim 9 into claim 8 (and

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canceling claim 9) would be one means of overcoming this rejection. Appropriate correction is required.

9. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 10-12 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Said claims are considered vague, indefinite, and/or confusing, because each claim is drawn to a specific type of process that is **different from** the process of claim 1 (upon which each of claims 10-12) depend, yet each claim appears to recite steps **already** recited in claim 1. **In particular**, claim 10: is drawn to “[a] process for the production of activated carbon from particulate petroleum coke”; appears to initially recite the **same** process steps recited in claim 1—which itself is drawn to “[a] process of reducing the concentration of SO<sub>x</sub> in a SO<sub>x</sub>-containing gas”—**and** also depends upon claim 1 (so it is unclear if these same process steps are to be repeated or performed only once in the claimed process). **Analogously**, claim 11: is drawn to “[a] process for the production of elemental sulphur from a SO<sub>x</sub>-containing gas and particulate petroleum coke”; appears to initially recite the **same** process steps recited in claim 1—which itself is drawn to “[a] process of reducing the concentration of SO<sub>x</sub> in a SO<sub>x</sub>-containing gas”—**and** also depends upon claim 1 (so, here as well, it is unclear if these same process steps are to be repeated or performed only once in the claimed process). **Similarly**, claim 12 is drawn to “[a] process for recovering the heat of reaction in a process as defined in claim 1 **further comprising**” (emphasis added) and

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appears to initially recite the **same** process steps recited in claim 1 (so, here as well, it is unclear if these same process steps are to be repeated or performed only once in the claimed process). Appropriate correction is required.

11. Claim 11 is **further** rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Said claim is considered **further** vague, indefinite, and/or confusing, due to an antecedent basis problem. Specifically, neither claim 1 (upon which claim 11 depends) nor claim 11 itself provides proper antecedent basis for "said activated carbon", as recited in the last two lines of claim 11. Appropriate correction is required.

***Claim Rejections - 35 U.S.C. §§ 102 & 103***

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1, 3-5, 10 and 11 are rejected under 35 U.S.C. § 102(b) as anticipated by



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**or, in the alternative**, under 35 U.S.C. § 103(a) as obvious over Harryman (US SIR H1538). Harryman teaches processes “of utilizing a portion of a coal feedstock to a coal gasification plant for the removal of sulfur compounds from a gaseous stream comprising **sulfur dioxide** and hydrogen sulfide,... by contacting the gaseous stream with the coal feedstock” (see abstract, emphasis added). The coal may be a petroleum coke, per instant claim 1 (see col. 4, lines 11-15). Suitable temperatures for the Harryman desulfurization processes include **both** the lower **and** upper temperature limits recited in instant claim 3 (see col. 6, lines 3-28, especially lines 21 and 24). Suitable gaseous streams to be treated “are selected from any gaseous stream which contains either a trace or a substantial amount of sulfur compounds, particularly those comprising sulfur dioxide, **more particular those comprising more than 0.1% by volume of sulfur dioxide**”, per instant claim 4 (see col. 5, lines 41-46, emphasis added). “Non-limiting examples of the gaseous streams which can be treated by the... [Harryman] process include industrial **flue** gases, digester gases, and tail gases from sulfur recovery units”, per instant claim 5 (see col. 5, lines 46-49, emphasis added). After treatment not only is the desulfurized gaseous stream removed, per instant claim 1, but **also** the Harryman “sulfur-laden coal”, per instant claim 10 (see Harryman Fig. 2, in concert with the corresponding description at col. 6, line 29 – 54). It is respectfully submitted that the Harryman “sulfur-laden coal” must **inherently** read on applicant’s claim 10 “activated carbon”, given that the **same** reactants, processing steps, **and** processing temperatures are **clearly** taught by Harryman. **Furthermore**, the treated gaseous streams are “fed to a sulfur recovery unit, such as a Claus sulfur recovery

unit... or a SUPERCLAUS sulfur recovery unit”, wherein “elemental sulfur”, per instant claim 11, is recovered (see col. 7, lines 25-35, noting reference character 619 in Fig. 2).

**Accordingly**, Harryman anticipates applicant’s claims 1, 3-5, 10 and 11, since processes meeting all material limitations of these claims, as broadly recited therein, are **clearly** disclosed. **Alternatively**, it could be argued that Harryman does not **fully** anticipate these claims of applicant, since petroleum coke does not appear to be actually used in any of the working examples (see “Illustrative Embodiment” in cols. 8-10). **However**, even if not anticipated, then, **at the least**, processes falling within the scope of applicant’s claims 1, 3-5, 10 and 11 would have been obvious to one of ordinary skill in the art, at the time of the instant invention, because, as just discussed, the broad teachings of Harryman **clearly encompass** processes meeting all instantly recited requirements.

15. Claim 2 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Harryman, **either** alone **or, in the alternative**, in view of Funk (US 4,650,496). Harryman is relied upon as set forth immediately above, anticipating or, at the least, having rendered *prima facie* obvious processes, per applicant’s independent claim 1 (upon which instant claim 2 depends). Instant claim 2 is **not** similarly anticipated though, in that while Harryman does teach the use of petroleum coke, “fluid coke” is not **explicitly** taught. **However**, it has been long known in the art that petroleum coke exists in two forms: delayed coke and fluid coke. **Therefore**, it would have been obvious to one of ordinary skill in the art, at the time of applicant’s invention, to have selected fluid coke when using petroleum coke in the Harryman processes, because, as

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just noted, one of ordinary skill would have readily recognized that the petroleum coke taught by Harryman could be used as either delayed coke or fluid coke.

16. **Alternatively**, Funk establishes that it has been long known in the art that petroleum coke exists in two forms: delayed coke and fluid coke, **expressly** stating that “[t]here are at least two types of petroleum coke: delayed coke and fluid coke” (see col. 5, lines 8-19, especially lines 9-11). **Therefore**, it would have been obvious to one of ordinary skill in the art, at the time of applicant’s invention, to have selected fluid coke when using petroleum coke in the Harryman processes, because, as just discussed, Funk establishes that one of ordinary skill would have readily recognized that the petroleum coke taught by Harryman could be used as either delayed coke or fluid coke.

17. Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Harryman **either** alone **or, in the alternative**, in view of Budininkas et al. (US 3,615,219). Harryman is relied upon as set forth in paragraph 14. above, anticipating or, at the least, having rendered *prima facie* obvious processes, per instant claims 1 and 4 (upon which instant claim 6 depends). Instant claim 6 is **not** similarly anticipated though, in that while Harryman does teach that, again, “[n]on-limiting examples of the gaseous streams which can be treated... include industrial flue gases, digester gases, and tail gases from sulfur recovery units” (see again col. 5, lines 46-49), the use of “smelter gas” is not **explicitly** taught. **However**, it has been long known in the art that not only do industrial flue gases contain SO<sub>2</sub> that needs to be removed, but so **also** do smelter gases. **Therefore**, it would have been obvious to one of ordinary skill in the art, at the time of applicant’s invention, to have selected a smelter gas when treating **other**

SO<sub>2</sub>-containing gaseous streams in the Harryman processes (i.e., beyond those types **specifically** suggested), because, as just noted, one of ordinary skill would have readily recognized that smelter gas could be used as an SO<sub>2</sub>-containing gaseous stream to be treated as **generally** taught by Harryman.

18. **Alternatively**, Budininkas et al. establish that it has been long known in the art that “there are many waste gases that contain sulfur dioxide as a constituent. Such gases include flue gases, smelter gases, and off gases from chemical processes” (see col. 1, lines 30-33). **Therefore**, it would have been obvious to one of ordinary skill in the art, at the time of applicant’s invention, to have selected a smelter gas when treating **other** SO<sub>2</sub>-containing gaseous streams in the Harryman processes (i.e., beyond those types **specifically** suggested), because, as just discussed, Budininkas et al. establish that one of ordinary skill would have readily recognized that smelter gas could be used as an SO<sub>2</sub>-containing gaseous stream to be treated as **generally** taught by Harryman.

19. Claims 8 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Harryman in view of Chang et al. (US 6,451,094 B1). Harryman is again relied upon as set forth in paragraph 14. above, anticipating or, at the least, having rendered *prima facie* obvious processes, per applicant’s independent claim 1 (upon which instant claims 8 and 9 depend). Instant claims 8 and 9 are **not** similarly anticipated though, in that while Harryman does teach the use of petroleum coke to remove SO<sub>2</sub> from the various gaseous streams to be treated, there is no disclosure of the simultaneous removal of a metal species, such as mercury.

20. Chang et al. teach methods for removal of vapor phase contaminants from a gas

stream by in-situ activation of carbon-based sorbents, including petroleum coke (see claims 1 and 2, especially the latter, as well as col. 5, lines 4-7). Chang et al. **further** teach that the vapor phase contaminants comprise vapor phase mercury (see claim 7, as well as col. 2, lines 40-51). **Therefore**, it would have been obvious to one of ordinary skill in the art, at the time of the instant invention, that, when having utilized petroleum coke in the Harryman gaseous stream SO<sub>2</sub>-removal processes, mercury would have **also** been removed, because, as just discussed, Chang et al. **clearly** teaches same.

21. Claims 1, 3 and 7 are rejected under 35 U.S.C. § 102(b) as anticipated by **or, in the alternative**, under 35 U.S.C. § 103(a) as obvious over JP 51-79676 (hereinafter "JP '676"). JP '676 teaches exhaust gas purification from cement kilns to reduce amounts of **both** sulfur **and** nitrogen oxides (see title of corresponding DERWENT abstract). The process comprises adding a carbonaceous powder, which may be petroleum coke powder, per instant claim 1, to the exhaust gas at 500 to 1200 °C, this range **clearly encompassing** that recited in instant claim 3 (see corresponding DERWENT abstract). **Accordingly**, JP '676 anticipates applicant's claims 1, 3 and 7, since processes meeting all material limitations of these claims, as broadly recited therein, are **clearly** disclosed. **Alternatively**, it could be argued that JP '676 does not **fully** anticipate these claims of applicant, since it cannot be determined from the abstract alone if petroleum coke is actually used in any of the working examples. **However**, even if not anticipated, then, **at the least**, processes falling within the scope of applicant's claims 1, 3 and 7 would have been obvious to one of ordinary skill in the art, at the time of the instant invention, because, as just discussed, the broad teachings of JP '676 **clearly**

**encompass** processes meeting all instantly recited requirements.

22. Instant claim 12 has not been rejected on prior art grounds, in that the prior art of record does not teach nor suggest processes "for recovering the heat of reaction in a process as defined in [instant] claim 1 **further comprising**" (emphasis added) those steps recited as (a), (b) and (c) in claim 12, and thus, **presumably** (note the corresponding 35 U.S.C. 112, second paragraph, rejection in paragraph 10. above), processes comprising **at least one repetition** of step (a) as recited in this claim.

### ***Conclusion***

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. These references are considered **cumulative to or less material than** those discussed above. Note that the Chang et al. patent cited on the enclosed PTO-892 is a continuation-in-part of the Chang et al. patent applied above (and cited on the enclosed PTO-1449).

24. Any inquiry concerning this communication should be directed to Ardith E. Hertzog at telephone number (571) 272-1347. The examiner can normally be reached on Monday through Friday (from about 8:30 a.m. - 4:30 p.m.).

25. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley S. Silverman, can be reached at (571) 272-1358. The fax phone number for the organization where this application is assigned is 703-872-9306.

26. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.


For more information about the PAIR system, see <http://pair-direct.uspto.gov>. For any

questions on access to the Private PAIR system, contact the Electronic Business

Center (EBC) at 866-217-9197 (toll-free).



AEH  
August 9, 2004



STANLEY S. SILVERMAN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700